DESIGN AND MANUFACTURE THE OUTER SHELL OF DIESEL FURNACE

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A report submitted in partial fulfillment of the requirements for the award of the Diploma of Mechanical Engineering

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SUPERVISOR'S DECLARATION

I hereby declare that have read this project report and in my opinion this project report is sufficient in terms of scope and quality for the award of the Diploma of Mechanical Engineering

Signature :

Name of Supervisor : Mr. Asnul Hadi bin Ahmad

Date : 20th DECEMBER 2010

STUDENT'S DECLARATION

I declare that this report entitled "Design and Manufacture the outer shell of diesel furnace" is the result of my own research expect as stated in the references.The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : Tuan Mohd Shakir Bin Abu Bakar

Date : 20TH DECEMBER 2010

DEDICATION

To my parents,friends,without whom and his /her lifetime efforts, my pursuit of higher education would not have been possible and I would not have had the chance to study for a mechanical course.

Also to my supervisor's, Mr. Asnul Hadi Bin Ahmad and Instructor Engineer, without whose wise suggentions, helpful guidance and direct assistance, it could have neither got off the ground not ever been completed.

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ABSTRACT

There are a lot of diesel furnaces on the market today. The diesel furnace that is more synonymous with the duty of non-ferrous metal melting. Today, this material has been readily adopted into the diesel furnace which has a different function and form designing. However, there is no diesel furnace designs and inventions that have various functions in the market. By creating a diesel furnace is functional, is expected not only to attract the attention of consumers because of the nature and function more effectively but also can help users to work more comfortably by using a tool only and is not directly save costs and time expense of consumers. The results showed the original objectives of the project to produce diesel furnace and various functions can be used for a variety of situations is achieved. Any problems and suggestions related to the products discussed in this final chapter.

ABSTRAK

Terdapat banyak relau bagas diesel di pasaran hari ini. Relau bagas diesel yang lebih sinonim dengan tugasnya meleburkan besi bukan ferus. Hari ini bahan ini telah di adaptasikan menjadi relau bagas diesel yang mempunyai pelbagai fungsi dan rekaan bentuk. Namun, belum terdapat rekaan dan ciptaan relau bagas diesel yang mempunyai pelbagai fungsi di pasaran. Dengan terciptanya relau bagas diesel pelbagai fungsi ini, diharapkan bukan sahaja dapat menarik perhatian pengguna disebabkan bentuk dan fungsinya yang lebih efektif malah dapat membantu pengguna melakukan kerja dengan lebih selesa dengan mengunakan satu alatan sahaja dan secara tidak langsung menjimatkan kos perbelanjaan dan masa pengguna. Keputusan kajian menunjukan objektif asal projek untuk menghasilkan relau bagas diesel pelbagai fungsi dan boleh digunakan untuk pelbagai situasi ini tercapai. Sebarang permasalahan yang berkaitan dan cadangan mengenai produk ini dibincangkan di bab terakhir.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

CHAPTER 1 is the introduction chapter of this project. Generally, it discuss about the project background, problem statement, the objective, scope of project, and project gantt chart.

1.2 PROJECT BACKGROUND

This project focuses on designing the outer shell to support the furnace diesel part in diesel furnace, such as buffer, refactory lining steel piles, bricks and a crucible. A diesel furnace as a device to generate a high heat using a diesel fuel from combustion of its burning system . The furnace is used exclusively to mean industrial furnaces which are used for many things, such as the extraction of metal from ore (smelting) or in oil refineries and other chemical plants, for example as the heat source for fractional distillation columns.

The term furnace can also refer to a direct fired heater, used in boiler applications in chemical industries or for providing heat to chemical reactions for processes like cracking.The heat energy to fuel a furnace may be supplied directly by fuel combustion, by electricity such as the electric arc furnace, or through Induction heating in induction furnaces.

1.3 PROBLEM STATEMENT

Mostly, current the diesel furnace has limited space. It cannot put anything on their diesel furnace. This project is to design the outer shell and the hanger on the diesel furnace.

1.4 OBJECTIVE

The objective of this project is:

i. To design and manufacture the outer shell of diesel furnace.
ii. To design and manufacture the hanger for diesel furnace.

1.5 SCOPE

In this project, scope performed a range in the completion of a project.The scopes of this project are:

i. This study is focused on making the outer shell of diesel furnace.
ii. The size of the diesel furnace is 586mm for diameter and 570mm for high.
iii. Function to apply in foundry lab.

1.6 GANTT CHART

Gantt chart is an important to guide work process during this project. With gantt chart what need to be done first can be plan accordingly.Other than that, this project will run smoothly and finish on time. Refer Appendix A to see a gantt chart diagram.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

CHAPTER 2 is the literature review of the project.In this chapter, there are type of furnace available in market of various design and use various material as a source of combustion in manufacture.It also have fabrication planning process.

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2.2 TYPES OF FURNACES

2.2.1 Furnace 1

Pusher Type Forging Furnaces is another name for variety of Batch Type Forging Furnaces which are largely used for ferrous and non ferrous forgings. The range of forging furnace design, use the best mix burner and is renowned providing optimum heat performance. It also comes with optional accessories which includes Automatic on/off system panel board.In-order to improve the efficiency of the furnace and the quality of the products, the burner is fitted into the roof so that the materials below on the hearth are heated directly. Further, use a recuperator to enhance the operations of the furnace and to provide more energy saving based on figure 2.1 and figure 2.2.

Figure 2.1: Batch type forging furnace

Figure 2.2: Box Type Tampering Furnace

2.2.2 Furnace 2

Used for an extensive variety of ferrous materials like steel and cast iron, the electrically heated nitriding liquid is an expedited nitride in nitrocarborising bath. After treatment, the component has less resistance diffusion layer, which is very effective in imparting greater life to the material.The figure 2.3 shown liquid nitriding furnace.Distinctive components treated by nitriding liquid are:

i. Timing gears
ii. Rocker arm shaft
iii. Water dies
iv. Sliding gate valves
v. Plastic extrusion screws
vi. Punching dies

Figure 2.3: Liquid Nitriding furnace

2.2.3 Furnace 3

Pigeon Type Up-setter Forging Furnace is for its world class quality, precise functioning, and accurate performance based on figure 2.4 and figure 2.5. These furnaces are available in varied capacities, moreover even provide range for using it These cost-effective, sturdy and durable furnaces are in great demand due to the following features:

i. Automatic on/off system
ii. Uniform temperature
iii. High class refractory used for radiation losses to maintain skin temperature.

Figure 2.4: PIT Type Gas Carburizing Furnace

Figure 2.5: Pigeon Type Upsetter Forging Furnace

2.2.4 Furnace 4

Muffle Type Furnace, which finds application in various chemical industries including otherwise. the designing furnaces as per the specifications to faster of material in burn show in figure 2.5. Additionally, the furnaces design are heated quickly and consume less fuel are useful for the following process:

1. Normalizing
2. Stress-relieving
3. Hardening

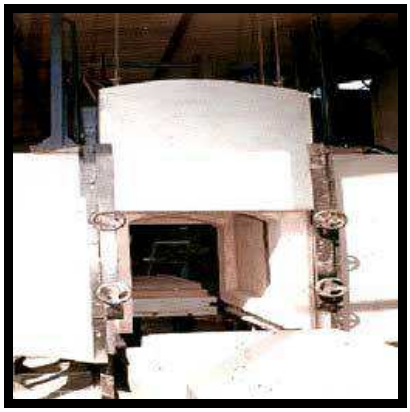

Figure 2.6: Muffle Type Furnace

2.3 FABRICATION PLANNING PROCESS

2.3.1 Shearing

Cutting processes are those in which a piece of sheet metal is separated by applying a great enough force to cause the material to fail. The most common cutting processes are performed by applying a shearing force, and are therefore sometimes referred to as shearing processes.

The shearing process is performed on a shear machine, that can be operated manually (by hand or foot) or by hydraulic, pneumatic, or electric power. A typical shear machine includes a table with support arms to hold the sheet, stops or guides to secure the sheet, upper and lower straight-edge blades, and a gauging device to precisely position the sheet.

The sheet is placed between the upper and lower blade, which are then forced together against the sheet, cutting the material. In most devices, the lower blade remains stationary while the upper blade is forced downward. The upper blade is slightly offset from the lower blade, approximately 5-10% of the sheet thickness. Also, the upper blade is usually angled so that the cut progresses from one end to the other, thus reducing the required force.

It plan to cut the mild sheet metal according to the actual size was decided. Figure 2.7 below show how the shearing process work.

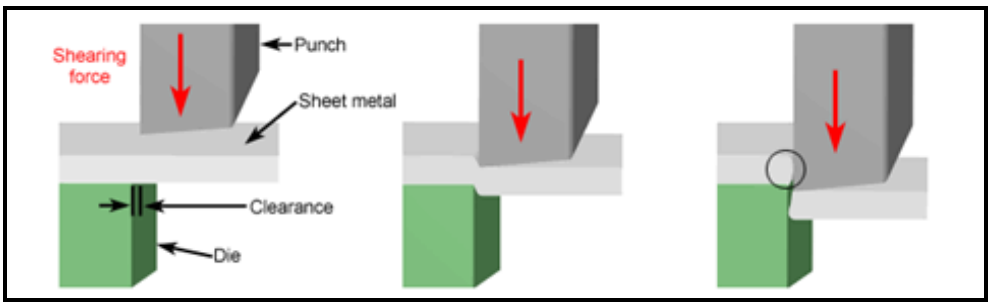

Figure 2.7: Shearing process

2.3.2 Lathe

A lathe is a machine tool which turns cylindrical material, touches a cutting tool to it, and cuts the material. A material is firmly fixed to the chuck of a lathe. The lathe is switched on and the chuck is rotated. And since the table which fixed the byte can be moved in the vertical direction and the right-and-left direction by operating some handles.

In order to get an efficient process and beautiful surface at the lathe machining, it is important to adjust a rotating speed, a cutting depth and a sending speed as shown in Figure 2.8. It plan to use lathe machine for mild steel shaft and hollow shaft. Use it to make a facing and material remove to get an actual dimension.

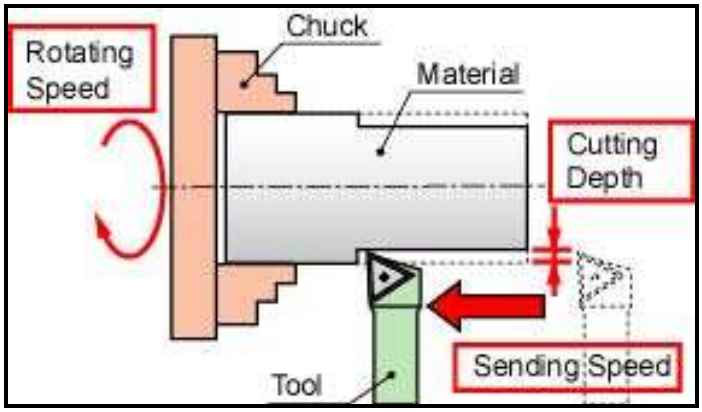

Figure 2.8: Important element of lathe machine

2.3.3 Shielded metal arc welding (SMAW)

Shielded metal arc welding (SMAW) as shown the figure 2.9, also known as manual metal arc (MMA) welding or informally as stick welding, is a manual arc welding process that uses a consumable electrode coated in flux to lay the weld.An electric current, in the form of either alternating current or direct current from a welding power supply, is used to form an electric arc between the electrode and the metals to be joined.As the weld is laid, the flux coating of the electrode disintegrates,giving off vapors that serve as ashielding gas and providing a layer of slag,both of which protect the weld area from atmospheric contamination.

Figure 2.9: Shielding metal arc welding